

Integrated Three-Port Converters for Compact and Efficient Power Management, Phase I

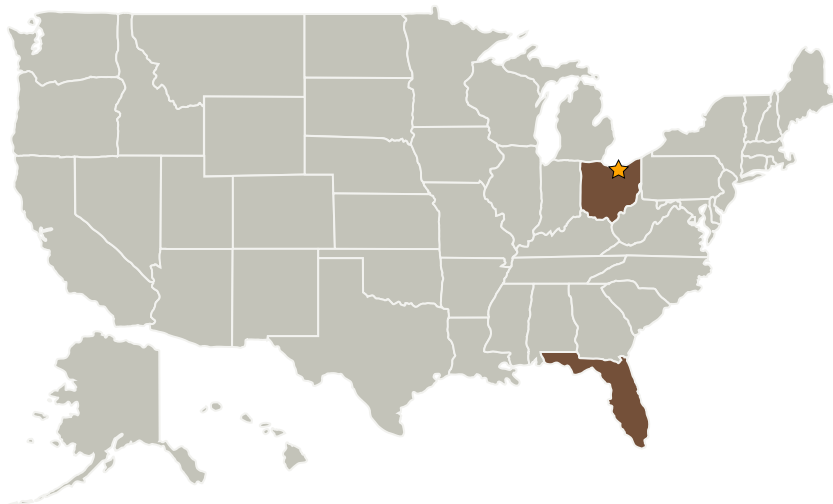
Completed Technology Project (2007 - 2007)



Project Introduction

To meet the ever-increasing power demand of today's spacecraft systems, an integrated power electronics system capable of interfacing, and simultaneously controlling, three power ports will be designed and demonstrated in Phase I of the proposed project. This new proposed power electronic architecture employs a single-stage power topology, thus allowing cost-effective control of power flow with improved efficiency, power density, and reliability. This is achieved by modifying the switching patterns and control strategy of suitable conventional isolated converters, fully utilizing digital power electronics control methods. The result is multi-function utilization of converter components for increased capabilities with minimal effects on losses, size, weight and cost for such components. Moreover, existing engineering design concepts can be easily used to optimize the new proposed power topologies in a fashion similar to the conventional mother topologies including soft-switching techniques, component selection, and magnetic design procedures at higher switching frequencies. Each of these topologies is capable of performing simultaneous control of two of its three ports from battery or ultra-capacitor charge regulation, solar array peak power tracking, and/or load voltage regulation. Such converters are valuable alternative for designers of power systems requiring multiple power sources, or interfaced to power storage devices.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
APECOR	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Orlando, Florida

Primary U.S. Work Locations

Florida	Ohio
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.3 Power Management and Distribution
 - └ TX03.3.1 Management and Control